chanced to see the vegetation from the equator to high latitudes in both hemispheres under some variety of circumstances, and the only families of plants which I could perceive followed humidity through many different parallels were Hepaticæ and Lichens; from the moist pine-forests of the north to the warm sunny clime of the equator, wherever the atmosphere is humid, these abound. In the former, the surface of the large vegetation, the soil, and denuded rocks have each their investment; whilst in the latter it is the trunks of the trees chiefly which support many brilliant and fascinating species.

[To be continued.]

XXXVII.—*On the Conferva which vegetates on the skin of the Gold-fish.* By John Goodsir, Conservator of the Museum of the Royal College of Surgeons in Edinburgh*.

Lady Brisbane having observed that a gold-fish which had lived for some time in a glass vase presented a very unusual appearance, as if a quantity of cotton were attached to its dorsal fin and tail, requested Mr. Bryson to explain the circumstance. That gentleman, having seen in the 'Microscopic Journal' a notice of the occurrence of vegetables parasitic on living animals †, at once suspected that the cotton-like substance was a plant. Lady Brisbane kindly allowed him to remove the fish to Edinburgh for more accurate examination. Mr. Bryson sent it to me, with the information that the peculiar substance had made its appearance on the animal six weeks before.

The fish had been conveyed to town in a jug of water, but had died on the journey, so that I lost the opportunity of observing the parasite during the life of the animal. The water had begun to be tinged with blood and colouring matter from incipient putrefaction. The results of the examination were not, therefore, so satisfactory as I could have wished.

The parasite, when examined under water, presented to the naked eye a continuous mass consisting of minute filaments about three-quarters of an inch in length, and extending all along the dorsal and posterior edge of the tail-fins. The filaments, although individually transparent, were so close to one another and so numerous, that the mass appeared opake. When the lateral portions of the mass were separated along the median line, so as to display the free edges of the fins,

* Read before the Botanical Society of Edinburgh, Jan. 13, 1842.

† See Ann. and Mag. Nat. Hist., vol. viii. p. 229, and p. 10 of this volume.—Ed.

these edges were observed to be shrivelled, not, as appeared to me, by a process of ulceration, but by an irregular interstitial absorption. This absorption was more evident along the bounding edge of the parasitic mass, where it presented the appearance of a furrow, in which the parasite grew with more luxuriance than elsewhere.

What was the exact state of the surface to which the parasite adhered I am not prepared to say. I could detect no substance corresponding to the false membrane described by certain observers as constituting the soil on which vegetate those parasites which infest the air-cells of birds; neither could I satisfy myself that the substance which formed the infested surface was merely the mucous covering of the fish. I am inclined however to lean to the latter opinion, for two reasons; first, because the surface exhibited the pigment cells of the skin; and secondly, because I detected solitary individuals attached to the broad scales of the back.

Each plant consists of a jointed filament, in some individuals single, in others dividing dichotomously towards the attached extremity, but more frequently near the summit. The filament tapers gradually from the base to the summit. The former is very slightly dilated, rounded and closed at the extremity, which is destitute of appendages. The latter varies in different individuals under different circumstances, as will be afterwards described. The articulations are elongated, varying in length from ten to fifty times their breadth. Basal articulations were met with, having a breadth of the 800th of an inch; acute or barren terminal articulations were about the 2000th of an inch. The length of the articulations increased towards the summit, the basal being in general the shortest. Each articulation was tubular, filled with a transparent fluid in which floated granules. Their walls appeared to be homogeneous, I could detect no double membrane; but at the spot where the neighbouring articulations were connected, the internal surface of each appeared to leave the external surface of the filament so as to form by conjunction the flat diaphragms. It would appear, then, that the walls of the cells are originally double, but have coalesced in the progress of growth. Towards the basal extremity of each articulation, generally close upon it, but sometimes a little removed, is a globular transparent vesicle. This vesicle varied in size, directly as the diameter of the articulation. I did not observe this vesicle in any instance exhibiting a nucleus or granular contents. I occasionally observed it floating free in the fluid of the articulation; but this might have been the effect of violence. The fluid of certain of the articulations contained gra-

nules about the 5000th to 6000th of an inch. Others again contained no granular matter. These granules did not exhibit molecular motion. I, on more than one occasion, observed a steady onward motion of the granules and transparent vesicle; but this appeared to depend on unequal pressure and level of the object plates.

From certain spots on the external surface of the articulations—spots which appeared to be arranged in no appreciable order, there sprung bundles of very numerous, cylindrical, elongated and transparent filaments. These were so numerous and so convoluted and twisted as to defy every attempt to disentangle them; in fact, they occasionally obscured altogether the stems or primary filaments of the plant. They arose from all the articulations except the basal and terminal, at least I never saw them springing from the latter, although I occasionally saw them arising from what I took to be the upper end of a basal articulation. They were quite cylindrical, as thick at their free as at their attached extremities, and about $\frac{1}{4000}$th of an inch in diameter. In structure they were homogeneous, apparently gelatinous, and covered with a fine membrane.

This parasite propagates by spores formed in its terminal articulations, which become developed into spore-cases for that purpose. Having observed terminal articulations in all stages of development, I may state the changes they undergo to be the following:—

1. A perfectly barren terminal articulation is elongated, spear-shaped, transparent, without granules.

2. A terminal articulation which is destined to become a spore-case does not elongate so much, and is from the first, or at least from an early period of its growth, full of granules, which give it a gray colour. It is also elongated, fusiform, and connected to the penultimate articulation by a narrow neck.

3. It becomes more distinctly fusiform, retaining its other characters.

4. The granules appear here and there to increase in size, or at least larger granules appear diffused through the mass. These larger granules or vesicles are more or less transparent. The articulation now becomes cylindrical, with rounded extremities and a constricted neck.

5. The articulation increasing in dimensions, but retaining the same shape, contains a packed mass of perfectly transparent globules, which are uncompressed and without appreciable internal structure.

6. The fertile articulation or spore-case bursts; that is, I

have seen it with its contents hanging together from a rupture in its walls.

Proceeding to observe the changes which the spore itself undergoes, I detected lying here and there, among the attached extremities of the primary filaments, groups of spores corresponding in numbers and characters to those which I had seen escaping from the spore-cases.

The most careful examination revealed no nuclei or contents of any kind in these transparent vesicles, which in this their perfect state were about $\frac{1}{2000}$th of an inch in diameter.

The first step in the development was an opacity of the spore, due to the development of granules similar to those which have been so often mentioned.

2. The vesicle elongates.

3. It appears double; that is, two-celled.

4. Both cells elongate and acquire additional cells at the extremity, which is known to be the terminal extremity by secondary filaments appearing on it.

A sufficient number of examples could not be met with to trace these changes with greater minuteness, so that certain circumstances which I was anxious to detect, and to which I shall allude immediately, escaped observation.

I may state that I met with one example of the incipient development of a dichotomous primary filament. It occurred at the point of attachment of a fertile articulation, and might therefore be considered, in some measure, as one mode in which the primary filament or axis of the individual is continued, when its elongation would otherwise have been interrupted by the development of the former terminal articulation into a spore-case.

This incipient lateral filament appeared as a conical projection from the side of the upper extremity of the penultimate articulation. I could not make out the existence of a diaphragm at the base of the little cone; as however it, as well as the penultimate articulation, was full of granular matter, a diaphragm might have existed, although I did not observe it. A clear vesicle, such as I have formerly described, was situated at the terminal extremity of the penultimate articulation; but whether it belonged to the new articulation or to the old one, I could not determine.

I have been unable to determine in a satisfactory manner the exact nature of the clear vesicle which is found in each of the articulations. It may be the nucleus of the original cell of the articulation; but if it be so, it must be considered as a barren nucleus; having increased in size proportional to its cell, having lost the normal appearance of a nucleus, and

having never performed the function of one. May it not, with greater propriety, be considered as some form of the endochrome, a result of development of the granules of the articulation? It exactly resembles the spores of the terminal articulations, which, as has been already stated, originate in the granular endochrome of this articulation.

The parasitic plant I have now described resembles in many respects those found by Hannover and Stilling on the newt and frog. As in these, the filaments swarmed with infusorial animalcules, *Monads*, *Bursariæ*, &c. Some of these doubtless lived among the filaments while the fish was still alive; others, again, as the *Bursariæ*, must have taken up their residence there after the commencement of putrefaction. Hannover in Müller's 'Archiv,' 1842, page 73, has described the development of the conferva of the frog and newt, and has mentioned the animal-like movements of the spores. Mr. Daniel Cooper ('Microscopic Journal') has frequently observed a cotton-like conferva on the gills and fins of gold-fish. From a preserved specimen, an examination of which was afforded me by Prof. Balfour, I am inclined to believe in the existence of more than one species of this genus of parasitic Algæ.

BIBLIOGRAPHICAL NOTICES.

Gould's Birds of Australia. Parts I. to VI. Folio. 1841–42.

One hundred plates of this magnificent work are now before the public; it seems therefore high time that some notice of its contents should be given to such of our readers as may not have seen the original. Great as is the excellence of Mr. Gould's former publications, there can be no doubt that the present work exceeds them all, both in an artistic and in a scientific point of view. Additional practice in designing and additional opportunities of studying animated nature have greatly improved his pictorial powers, while his recent excursions in the wilds of Australia have supplied him with a mass of novel and original information of the highest value to the ornithologist. Students in that science too often have to regret their ignorance of the *natural history* of exotic species of birds. With no other data before them than a dried skin, they can only *conjecture* the real affinities of a species, while if they were acquainted also with its habits, food, nidification and anatomy, they might in general fix its true place in the system with the greatest certainty. As far as Australian ornithology extends, this desideratum will now be supplied by the labours of Mr. Gould and of those whom he will induce to tread in his steps; and if his efforts should in some degree allure our countrymen in the other hemisphere from the race-course and the gaming-table to a study of the works of Creation, the moral influence of his work will not be one of its least recommendations.